

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) A method of detecting a position of a printed-wiring board as held by a board supporting device in a printed-wiring-board working system arranged to effect a working operation on a front surface of said printed-wiring board, by a working head located above the printed-wiring board as held by the board supporting device, said method comprising the steps of:

operating at least one image-taking device to take an image of each of at least one indicium provided on a back surface of said printed-wiring board as held by said board supporting device, said image being taken in an upward direction toward said back surface; and

detecting the position of said printed-wiring board on the basis of a position of said image of each of said at least one indicium in an imaging area of the corresponding one of said at least one image-taking device.

2. (Original) A method according to claim 1, wherein said at least one indicium consists of at least one fiducial mark positioned on said back surface of said printed-wiring board, in a predetermined positional relationship with a printed wiring pattern formed on said front surface of said board.

3. (Original) A method according to claim 1, wherein said at least one indicium consists of at least one predetermined portion of a printed wiring pattern which is formed on said back surface of said printed-wiring board, in a predetermined positional relationship with a printed wiring pattern formed on said front surface of said board.

4. (Original) A method according to claim 1, wherein said printed-wiring board has a plurality of indicia.

5. (Original) A method according to claim 4, wherein said at least one image-taking device consists of a plurality of image-taking devices, the method further comprising locating said plurality of image-taking devices at respective positions at which the images of said plurality of indicia can be respectively taken by said plurality of image-taking devices.

6. (Original) A method according to claim 4, wherein said image-taking devices are located at said respective positions before said printed-wiring board is held by said board supporting device.

7. (Original) A method according to claim 6, wherein said plurality of image-taking devices are manually located at said respective positions.

8. (Previously Presented) A method of effecting a working operation on a front surface of a printed-wiring board in a printed-wiring-board working system which comprises a board supporting device operable to hold said printed-wiring board, a working head which is located above the printed-wiring board as held by said board supporting device and operable to effect said working operation on said front surface of said printed-wiring board, and a relative-movement device operable to move said printed-wiring board and said working head relative to each other in a plane parallel to said front surface, said method being characterized by comprising the steps of:

operating at least one image-taking device to take an image of each of at least one indicium provided on a back surface of said printed-wiring board as held by said board supporting device, said image being taken in an upward direction toward said back surface;

detecting a positioning error of said printed-wiring board as held by said board supporting device, on the basis of a position of said image of said each indicium in an imaging area of the corresponding one of said at least one image-taking device; and

compensating a relative movement between said board supporting device and said working head by said relative-movement device, on the basis of said positioning error detected.

9. (Withdrawn) A printed-wiring-board working system for effecting a working operation on a front surface of a printed-wiring board, characterized by comprising:

a board supporting device operable to hold said printed-wiring board;

a working head operable to effect said working operation on said front surface of said printed-wiring board;

a relative-movement device operable to move said printed-wiring board and said working head relative to each other in a plane parallel to said front surface;

at least one image-taking device operable to take an image of each of at least one indicium provided on a back surface of said printed-wiring board as held by said board supporting device; and

a control device operable to control said working head, said relative-movement device and said at least one image-taking device, said control device detecting a positioning error of said printed-wiring board as held by said board supporting device, on the basis of a position of said image of said each indicium in an imaging area of the corresponding one of said at least one image-taking device.

and wherein said control device is operable to compensate a relative movement between said board supporting device and said working head by said relative-movement device, so as to reduce said positioning error detected,

10. (Withdrawn) A printed-wiring-board working system according to claim 9, further comprising an imaging-device holding device which is disposed so as to be opposed to said back surface of said printed-wiring board and which holds said at least one image-taking device.

11. (Withdrawn) A printed-wiring-board working system according to claim 10, wherein said imaging-device holding device includes a mounting device arranged to hold said at least one image-taking device such that a position of each of said at least one image-taking device is adjustable.

12. (Withdrawn) A printed-wiring-board working system according to claim 11, wherein said imaging-device holding device includes a support table having a flat supporting surface, and said mounting device includes a mounting member to which each of said at least one image-taking device is fixed, one of said support table and said mounting member including a magnet portion, while the other of said support table and said mounting member including a ferromagnetic portion formed of a ferromagnetic material.

13. (Withdrawn) A printed-wiring-board working system according to claim 11, wherein said imaging-device holding device has a flat supporting surface and a first and a second group of T-slots, said first group of T-slots consisting of a plurality of parallel T-slots, and said second group of T-slots consisting of a plurality of parallel T-slots perpendicular to the T-slots of said first group, and wherein said mounting device includes a plurality of T-blocks slidably received in said T-slots, and fastening members which cooperate with said T-blocks to hold said at least one image-taking device.

14. (Withdrawn) A printed-wiring-board working system according to claim 9, further comprising an imaging-device holding device which is movable in two mutually perpendicular directions and which holds said at least one image-taking device.

15. (Withdrawn) A printed-wiring-board working system according to claim 14, wherein said imaging-device holding device includes two movable members, and an X-axis drive device and a Y-axis drive device which include respective drive sources operable to move said two movable members in an X-axis direction and a Y-axis direction, respectively, and a controller for controlling said drive sources.

16. (Withdrawn) A printed-wiring-board working system according to claim 9, further comprising a moving device operable to move said imaging-device holding device toward and away from said back surface of said printed-wiring board held by said board supporting device.

17. (Withdrawn) A printed-wiring-board working system according to claim 9, wherein each of said at least one image-taking device includes a contact portion for contact with said back surface of said printed-wiring board, to support said printed-wiring board on said back surface.

18. (Withdrawn) A printed-wiring-board working system according to claim 17, wherein said contact portion has a contact surface shaped to enclose one of said at least one indicium such that said contact surface is located outwardly of said one indicium.

19. (Withdrawn) A printed-wiring-board working system according to claim 9, wherein said at least one image-taking device consists of a plurality of image-taking devices.

20. (Withdrawn) A printed-wiring-board working system according to claim 9, wherein said working head is an electric-component mounting head operable to mount an electric component at a predetermined position on said front surface of said printed-wiring board.

21. (Previously Presented) A method according to claim 1, further comprising a step of locating said at least one image-taking device on a lower side of said printed-wiring board as held by said board supporting device.

22. (Previously Presented) A method according to claim 1, wherein said working head is an electric-component mounting head operable to mount an electric component at a predetermined position on the front surface of said printed-wiring board.

23. (Previously Presented) A method according to claim 1, wherein said working head is adapted to perform an operation to apply an adhesive agent to the front surface of said printed-wiring board.

24. (Previously Presented) A method according to claim 1, wherein said working head is adapted to perform an operation to apply a solder to the front surface of said printed-wiring board.

2625. (Currently Amended) A method according to claim 8, further comprising a step of locating said at least one image-taking device on a lower side of said printed-wiring board as held by said board supporting device.

2726. (Currently Amended) A method according to claim 8, wherein said working head is an electric-component mounting head operable to mount an electric component at a predetermined position on the front surface of said printed-wiring board.

2827. (Currently Amended) A method according to claim 8, wherein said working head is adapted to perform an operation to apply an adhesive agent to the front surface of said printed-wiring board.

2928. (Currently Amended) A method according to claim 8, wherein said working head is adapted to perform an operation to apply a solder ~~to~~ onto the front surface of said printed-wiring board.

29. (New) A method according to claim 25, further comprising a step of bringing an upper end of each of said at least one image-taking device into contact with said back surface of said printed wiring board before said step of detecting the positioning error of said printed-wiring board.